

REMARKS

Reconsideration of this application is respectfully requested in light of the above amendments and following remarks. Claims 8, 9, 11, 20, 21, 23 and 25 – 27 are now cancelled.

I. The drawings were objected to under 37 CFR 1.83(a). The subject matter of claims 11 and 23 were consider to not shown the features of these claims.

Applicant has canceled claims 11 and 23 thus rendering this rejection moot.

II. The specification was objected to because of the following informalities: The specification was objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01 (0). Correction of the following was required: the first layer with resistive paste.

Applicant has canceled claims 9 and 21 and submits this renders this objection moot.

III. Claims 1-3, 5-7,10-13,17-19 and 22-24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Peters (US '259) in view of Liang et al. (US 6,492,883) and Ammar et al. (US '404).

Applicant begins with amended claim 1, which now provides:

1. (Currently Amended) A voltage-controlled tunable multilayer filter comprising:
a first resonator on a ~~first~~ top layer of low-temperature-co fired-ceramic (LTCC);
a second resonator coupled to said first resonator on a ~~second~~ bottom layer of low-temperature-co fired-ceramic (LTCC);
a third resonator coupled to said second resonator and cross coupled to said first

resonator;

an input transmission line connected to said first resonator;

an output transmission line connected with said third resonator; ~~and~~

a voltage tunable variable capacitor in at least one of said resonators[.]

a ground plane connected to said bottom layer with an isolation in said bottom layer of said ground plane;

a right side DC bias port in said bottom layer with a thruhole provided to a right-side of said microstrip-stripline resonator;

a left-side DC bias port with at least one thruhole to a left-side of said microstrip-stripline resonator; and

a center DC bias port with at least one thruhole to the center of said microstrip-stripline resonator.

Applicant has amended the present independent claims to include the unique components required for the novel incorporation of voltage tunable capacitors of the present invention. Liang nor any of the cited art discloses, suggests or teaches the included and claimed elements necessary for the LTCC based electronically tunable multilayer microstrip-stripline combline filter (e.g., the left, right, center bias ports as well as the isolated ground plane). The unique characteristics of using voltage tunable varactors mandates these components and there unique placement in the multilayered structure of the present invention. Indeed, Applicant has set forth the necessity for this beginning on page, 12 line 3, which provides:

The regular combline resonator is roughly one eighth of a wavelength. If the combline resonator is implemented in one layer, the filter size is generally large. Therefore, the comb line resonators in the present invention are implemented in multilayer topology to miniaturize the filter. To achieve better Q from the resonator structure, the good portion of the resonator has been implemented in the stripline form.

The stripline portions of the resonators are shown in Figures 4 and 5 as described above. The stripline portions of the two end resonators are in the same layer (layer 4).

As shown in Figure 5 at 500 the center resonator 510 is in a different layer 505. The resonators are placed in different layers to achieve less coupling between the adjacent resonators and to achieve the desired cross coupling between the two end resonators. The cross coupling between the two end resonators helps to create a transmission zero on the high side of the passband of the filter. This improves the high side selectivity at the expense of the low side selectivity degradation. This is desired for the transmit filters in the handset application.

The cross coupling can be exacerbated with the incorporation of the voltage tunable varactors and thus necessitated the placement of the elements and layers as claimed above. This difficulty would not have been known to Liang without undue experimentation and thus would not be obvious when Liang is combined with Ammar et al. and Peters.

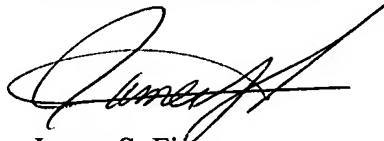
Thus, Applicant respectfully submits that with the above remarks and previous and current amendments, claims 1 and 13 and claims that depend therefrom are in condition for allowance.

CONCLUSION

Applicant thanks the Examiner for his time in examining the present application and respectfully submits that, in view of the foregoing amendments and remarks, the application is in clear condition for allowance. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. 1.16 or 1.17 to Deposit Account No. 502697. The Examiner is invited to contact the undersigned at 202-607-4607 to discuss any matter regarding this application.

Date: 6-24-06

Respectfully submitted,



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